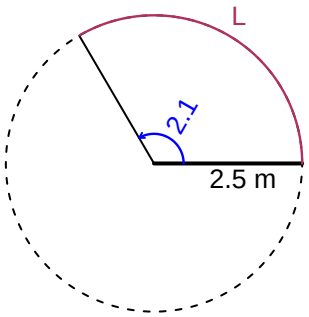
Name: Date:

Trig Final (SLTN v632)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 2.5 meters. The angle measure is 2.1 radians. How long is the arc in meters?

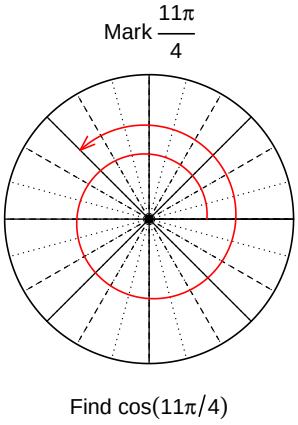


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

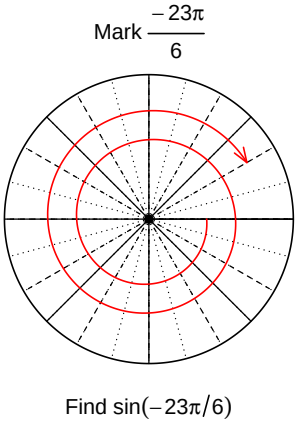
$L = 5.25$ meters.

Question 2

Consider angles $\frac{11\pi}{4}$ and $\frac{-23\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{11\pi}{4}\right)$ and $\sin\left(\frac{-23\pi}{6}\right)$ by using a unit circle (provided separately).



Find $\cos(11\pi/4)$



Find $\sin(-23\pi/6)$

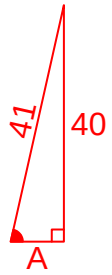
$\cos(11\pi/4) = \frac{-\sqrt{2}}{2}$

$\sin(-23\pi/6) = \frac{1}{2}$

Question 3

If $\sin(\theta) = \frac{40}{41}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

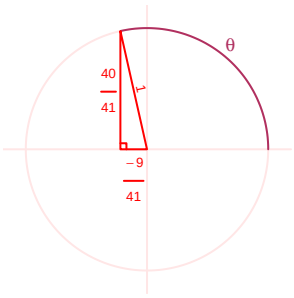
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 40^2 = 41^2$$
$$A = \sqrt{41^2 - 40^2}$$
$$A = 9$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-9}{41}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 5.94 Hz, an amplitude of 7.34 meters, and a midline at $y = -2.83$ meters. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -7.34\sin(2\pi 5.94t) - 2.83$$

or

$$y = -7.34\sin(11.88\pi t) - 2.83$$

or

$$y = -7.34\sin(37.32t) - 2.83$$